

Case Study

Access Pipeline Achieves Alarm Improvements through Rationalization



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- Allen Bauman, Automation Specialist, Access Pipeline Inc.

Background

Access Pipeline Inc. is owned by Devon NEC Corporation and MEG Energy Corporation, each with an undivided 50% working interest in the operation. Headquartered in Calgary, Alberta, Canada, it was established to construct, operate and manage the two corporations’ joint pipeline system assets.

The Access Pipeline system accommodates two steam-assisted, gravity drainage, heavy oil-producing facilities in the Christina Lake area of northeastern Alberta, where two heavy oil batteries are connected to the pipeline. Pipeline field operations are based out of the Sturgeon Terminal, 13 km east of Gibbons, Alberta. Additional resources are located in the Conklin area to assist with northern operations. Pipeline and facilities are monitored and controlled remotely via a Supervisory Control and Data Acquisition (SCADA) system. Local and remote computer systems provide necessary safeguards to operate the pipeline in accordance with Alberta Regulatory requirements.

Access Pipeline’s alarm rationalization program has helped reduce configured alarms and improve the alarm rate at its Christina Lake, Alberta site. The company’s alarm rationalization effort was initiated at the operational level and developed into a wider initiative supported by upper management. The work addressed the SCADA alarm system and controllers, ensuring ownership of the alarm problem at the operational level. During this project, strategies were developed to minimize the rationalization effort, maximize the use of participants’ time, and still deliver expected results.

Benefits

Rationalization is a key stage in the alarm management lifecycle defined in ISA-18.2, which forms the basis for implementing an alarm configuration and optimizing the performance of the alarm system. Access Pipeline’s project demonstrated the positive results of a comprehensive alarm rationalization effort. After completing a thorough rationalization, alarm systems can be expected to provide significantly less activation and fewer nuisance alarms. Furthermore, operator response to alarms will be faster and effective because alarms are more trusted, prioritized for correct action sequence, and free from clutter.

Access Pipeline’s initial alarm rationalization effort produced noteworthy results. Overall, rationalization reduced configured alarms by 65.7%. This included reductions in configured high-priority alarms by 26.2% and configured medium-priority alarms by 35.2%. At the same time, configured low-priority alarms increased by 26.25%.

Access Pipeline also gained many valuable insights from its work with Honeywell on alarm rationalization. For example, the company found that the success of alarm rationalization projects



Access Pipeline was established to construct, operate and manage pipeline system assets.

depends on detailed preparation, careful evaluation of the alarm system, and implementation of the right process pertaining to its business. Creating buy-in is essential, too, as it requires open discussions with alarm rationalization professionals and listening to all feedback.

In addition, Access Pipeline's experience demonstrated the importance of involving the right people on the project team. Specific learning included: Don't have people in the room who aren't positively contributing (if you attend, you participate), don't expect engineers to provide input all the time (accumulate questions and bring them in for specific reasons), and don't combine project team functions (a strong facilitator is needed to maintain productive discussions, and the designated scribe must have excellent spreadsheet and typing skills).

Other "lessons learned" in developing the Access Pipeline alarm rationalization process:

- Don't overlook the alignment of SCADA and HMI philosophies with alarm strategy
- Evaluate alarm descriptions and create a standard format providing sufficient detail for operators
- Avoid manual creation of alarm rationalization spreadsheets
- Use Honeywell's automated alarm management software package to generate required alarm rationalization forms (two initial sites were manually prepared and rationalized in approx. 260 hours; all 37 remaining sites were completed in approx. 300 hours after purchasing alarm management software)

Challenges

At modern industrial sites, poor performing alarm systems can overwhelm operators with alarm floods and hinder their ability to effectively manage process upsets. Experience has shown that time is the most critical factor in dealing with abnormal situations. Personnel must be able to take action within seconds in order to safely mitigate the impact of an upset.

Most pipeline operating companies equate alarm management with reducing alarms, however, this is only one piece of the puzzle. Operations staff needs enough information to prevent abnormal situations — and prohibit the escalation of situations that cannot be avoided.

Alarm management is a comprehensive process by which alarms are engineered, monitored, and managed to ensure safe and reliable operations. Industrial facilities focus on rationalizing alarm systems so control room personnel can effectively manage the process and not just respond to alarms during their shift. Alarm rationalization involves reconciling individual alarms

against the principles and requirements of the alarm philosophy. Relevant data for each alarm is documented to support other stages of the lifecycle.

Unique metrics can be used to measure alarm system performance in a process industry facility. Typical key performance indicators (KPIs) include:

- Total Alarms Generated by the System
- Total Alarms Presented to the Controller
- Chattering Alarm Occurrences
- Total Alarms Configured on the System
- Alarms Not in Service (disabled or inhibited)
- Duplicate Alarms

Solution

In 2008, Access Pipeline's automation team and control centre operators identified the need to better control and manage 11,000+ control system alarms. Several small and successful initiatives were undertaken during the following year. This included introducing alarm masking to reduce alarm flooding, adding first-in first-out (FIFO) sequence of events (SOE) routines to increase accuracy of the time stamp and cause of the SD, and eliminating latched alarms that didn't activate an automated SD.

In October 2010, Access Pipeline decided to build upon its previous alarm project by incorporating a comprehensive alarm rationalization process. Honeywell was engaged to perform an analysis comparing existing alarm performance with alarm management best practices. The project team determined that the Matrikon solution would be used to achieve its alarm management objectives.

The alarm analysis, conducted based on KPIs identified in relevant industry standards (e.g., EEMUA 191: Alarm Systems – a Guide to Design, Management and Procurement, and ISA 18.2: Management of Alarm Systems for the Process Industries), considered the current state of alarm system qualitative factors such as operator perception of the alarm system and management of change (MOC) practices regarding alarms. The study identified opportunities to reduce nuisance and redundant alarms, and determined that the overall SCADA alarm rate was unacceptable (approx. 40 alarms per hour during normal operating conditions).

Based on the results of its analysis, Honeywell recommended that Access Pipeline's status alarm latch functionality be reviewed and modified. Under the original system, operators could only tell if an alarm had cleared by sending a request to

reset. Having an indication to inform operators that an alarm has cleared removes one more issue requiring their attention.



Honeywell's alarm system analysis considered factors such as operator perception of the alarm system and MOC practices regarding alarms.

Honeywell also proposed solutions for reducing Access Pipeline's alarm count, including:

- Weekly review of top 10 most frequent alarms with goal of resolving issues prior to the next review (provided immediate reduction in alarms and improves alarm rate for operators)
- Focus on tags producing high number of alarms or with chattering alarms
- Prioritize groupings of correlated alarms once significant progress is made in eliminating unnecessary alarms

Further confirmation and review of alarm priority distribution data

Honeywell's specific alarm system recommendations were:

- Rationalize top 10 alarms
- Analyze root causes of alarms
- Avoid alarm suppression to eliminate annunciation of alarms to control room operators
- Modify control system to remove alarms in a managed and documented manner
- Review and delete non-essential, operator-settable alarms from the list
- Review relational alarms and determine if redundancy is required
- Eliminate alarms that serve no additional purpose other than information

Finally, Honeywell recommended a review of the SCADA design basis and addition of topics such as: lifecycle, roles and responsibility, training, management of change, alarm system performance monitoring, and scheduling a full rationalization for all alarms.

For More Information

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